

5 **WHAT IS CLAIMED IS:**

1. An autofocus module for a microscope-based system comprising:
 an objective that defines an image beam path which is perpendicular to a
 surface of a specimen and can be focused thereonto, and an illumination
10 beam path that encompasses a light source for illumination of the specimen,
 a light source that generates a measurement light bundle for determining
 at least one focus position;
 an optical element for splitting the measurement light bundle in such a
 way that an eccentrically extending annularly divergent measurement light
15 bundle is created; and for parallelizing a divergent measurement light
 bundle remitted from the microscope-based system ;
 a first dichroic beam splitter positioned in the image beam path of the
 microscope-based system, for coupling the eccentrically extending
 measurement light bundle eccentrically into the microscope-based system
20 and for directing it onto the surface of the specimen; and
 at least one optical means for directing the remitted measurement light
 beam bundle onto a differential diode.
2. The autofocus module as defined in Claim 1, wherein the optical means is a
25 prism that has a fully mirror-coated prism surface and a prism surface for
 total reflection, wherein the mirror-coated prism surface directs an
 eccentrically extending measurement light bundle out of the measurement
 light bundle.
- 30 3. The autofocus module as defined in Claim 1, wherein the optical element
 has a first and a second axicon.
4. The autofocus module as defined in Claim 3, wherein the first axicon shapes
 the measurement light bundle in such a way that an eccentrically extending
35 annularly divergent measurement light bundle is created; and the second

- 5 axicon parallelizes a divergent measurement light bundle remitted from the
 microscope-based system.
5. The autofocus module as defined in Claim 1, wherein the optical element is
 a toroidal lens.
- 10 6. The autofocus module as defined in Claim 5, wherein the toroidal lens is
 divided into a first segment and a second segment; and the first segment is
 configured such that an eccentrically extending annularly divergent
 measurement light bundle is created from the measurement light bundle; and
15 the second segment is configured such that a divergent measurement light
 bundle remitted from the microscope-based system is parallelized.
7. The autofocus module as defined in Claim 1, wherein the differential diode
 comprises a first and a second diode.
- 20 8. The autofocus module as defined in Claim 7, wherein the first and the
 second diode generate a differential signal that goes directly to an output
 section which then controls a motor for adjustment of the focus.
- 25 9. The autofocus module as defined in Claim 1, wherein the laser light source,
 the differential diode, the optical means, the optical element, a stationary
 lens, and a second dichroic beam splitter are arranged in a housing that is
 attached to the microscope-based system.
- 30 10. The autofocus module as defined in Claim 1, wherein the laser light source
 emits IR light as the measurement light.
11. The autofocus module as defined in Claim 1, wherein the microscope-based
 system and the autofocus module are connected to a computer or control
35 system.